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CRA
Consulting Engineers

CONESTOGA-ROVERS & ASSOCIATES LIMITED
651 Colby Drive,
Waterloo, Ontario, Canada N2V 1C2
(519) 884-0510

March 24, 1993

Reference No. 4550

Mr. S. Andrew Sochanski, P.G. (3HW42)
Remedial Project Manager
USEPA REGION III
841 Chestnut Building
Philadelphia, Pennsylvania
U.S.A. 19107-4431

Dear Mr. Sochanski:

Re: Residential Well Sampling Proposal
SRI/FS Limestone Road Site - Cumberland, Maryland

Conestoga-Rovers & Associates (CRA) is in receipt of the Environmental Protection Agency's (EPA) and Maryland Department of the Environment (MDE) comments on the above-noted report dated March 4, 1993. CRA has reviewed these comments and has prepared the attached responses for EPA and MDE review.

In response to your covering letter dated March 4, 1993, it is obvious there is some confusion on behalf of EPA. CRA is well aware of the sampling and analysis requirements specified for the residential wells in the Work Plan (WP), Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPjP). As a result, CRA did not specify these requirements in the proposal, as it would be redundant. The sampling of DW-16 for metals only is part of the plumbing evaluation. However, given the confusion, CRA will provide a statement that the proposed residential wells will be sampled and analyzed in accordance with the above-noted project documents.

With respect to your statement regarding concerns over the groundwater monitoring well sampling program, CRA has conducted all field activities to date in accordance with the project documents or agreed to modifications. If EPA has any concerns about the on-going groundwater monitoring well sampling program they should state them directly and CRA will address them accordingly.

With respect to the presence of contaminants emanating from the source areas, CRA believes that even in a fractured medium concentrations will be higher at the source and decrease along the migration pathway. The evidence indicates that the bedrock aquifer is made of a well developed three-dimensional fracture network. The aquifer is anisotropic, but not to the degree that there is one major preferential pathway. (See Long-Term Pumping Test Report). CRA perceives that the EPA is

considering the fracture network as a linear rather than a three-dimensional feature and as such is misconstruing potential contaminant migration.

It has been agreed that the monitoring well networks (with the proposed additional wells) are suitable for detecting contaminants potentially migrating from the disposal sites. Therefore, the presence of contaminants due to waste disposal should be detected in these wells prior to any detections in residential wells. One cannot reasonably expect contaminants to bypass the monitoring well network and nearby domestic wells to appear at residential wells farther afield, in the aquifer found beneath the Site. Therefore, CRA believes our conclusion regarding the presence of contamination is defensible.

In order to keep the project on schedule to the extent practicable, CRA is prepared to sample and analyze the ten residential wells of which we are in agreement in accordance with the WP, FSP and QAPjP. CRA has assumed that EPA has requested access to these residential properties for the purpose of sampling.

If you have any questions regarding the responses please contact the writer at (519) 884-0510 or Carol Dunnigan at (716) 283-6720. If required, CRA is willing to meet with the EPA and MDE to discuss these responses.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Michael G. Mateyk, P. Geol.

MGM/sr
Encl.
c.c. Peter Ludzia (USEPA)
Cynthia Nadolowski, Esq. (USEPA)
Dave Healy (MDE)
B. Michael Hodge, Esq.
P. M. Andrews, Esq.
Jack Michels

COMMENTS ON
RESIDENTIAL WELL SAMPLING PROPOSAL REVIEW
FOR THE LIMESTONE ROAD SITE

OVERALL COMMENTS

1. Comment

The proposal must cite or reference sampling procedures, sampling parameters, etc., in accordance with the approved Work Plan ("WP"), the approved Field Sampling Plant ("FSP") and the approved Quality Assurance Project Plan ("QAPjP") which were developed for the site by Geraghty and Miller.

Response

CRA believed such citation would have been redundant. However, given the confusion this has caused with the EPA, the project documents will be cited in the revised proposal.

2. Comment

The proposal is inconsistent with the approved WP, FSP and QAPjP.

Response

CRA fails to see how the EPA could say the proposal is inconsistent with the project documents. CRA is well aware of the sampling and analysis requirements for the residential wells. The sampling of DW-16, proposed on page 13 of the report, was clearly identified as part of the plumbing evaluation. However, to avoid any further confusion, the sampling and analysis requirements for the residential wells will be cited in the revised reports.

3. Comment

The proposal must include all residential wells in the sampling event because residential wells that are down gradient and side gradient fro the City Dump (if present) needs to be sampled. Current sampling efforts in this general area are inadequate.

Response

The purpose of the SRI/FS is to determine if there has been an impact on the groundwater as a result of waste disposal at the Limestone Road Site. The potential impact of the City Dump is clearly beyond the scope of the SRI/FS and is not required under the Record of Decision (ROD) or the Partial Consent Decree (PCD). It is curious that the EPA requires all wells to be sampled irrespective to the Site-specific data generated during the long-term pumping test; but rather due to the presence of the City Dump.

Sufficient data has been collected during the RI to confirm the absence of groundwater impact at most residential wells. The residential wells proposed for sampling and analysis will confirm or disprove the RI data based on the current understanding of groundwater flow and potential contaminant migration pathways.

SECTION 3.0 HISTORICAL RESIDENTIAL WELL SAMPLING

1. Comment

According to EPA's information the number of private residential wells adjacent to the site is not eighteen (18) but twenty two (22).

Response

The number of residential wells sampled during the RI was eighteen. In 1990, six residential wells were sampled by EPA. Two of these wells were previously sampled, while four were sampled for the first time. These additional four wells will be added to the and tables of the report.

2. Comment

Data from EPA's sampling which was conducted in September 1990 must also be included in the text and the SRI/FS reports.

Response

Agreed.

SECTION 3.1 ANALYTICAL RESULTS

1. Comment

The text must separate prior sample data from recent data. It is recommended that the data be segmented into RI/FS groundwater data, RI/FS residential data, Subsequent Data (post RI and pre SRI data) and SRI bedrock sample data.

Response

Agreed.

2. Comment

The supposition stating that toluene and bis(2-ethylhexyl) phthalate were both qualified and therefore not considered further is incorrect. The Record of Decision (ROD) was written for soil contamination (cadmium, chromium and lead) in excess of the capping criteria. The SRI/FS will look at all contamination (organics, semi-volatiles, inorganics, and etc.) found in groundwater. If the groundwater poses an unacceptable risk for any contamination, all possible options for remediating the site for groundwater will be considered. Anything less is unacceptable.

Response

Toluene and bis(2-ethyl hexyl)phthalate were qualified due to blank contamination and bis(2-ethyl hexyl)phthalate was detected in upgradient wells. Therefore these compounds *"were not considered further"* in the selection of residential wells to be included in the sampling program. The Site-specific parameters of cadmium, chromium and lead were selected as indicators of Site-specific groundwater contamination.

CRA agrees that all compounds will be considered in baseline risk assessment to be included in the SRI report.

3. Comment

Last paragraph page 9: It is stated that contaminants migration form the site to nearby residential wells should move in a discrete plume rather that through independent, segregated pathways which would give the existing random array of contaminant concentrations. This concept of uniform plume migration in a fractured bedrock aquifer is neither to be expected nor is it substantiated by the long-term pump test results. Some of the indications of fracture-controlled, anisotropic aquifer permeability at the site include:

A. The wide range of values on the distance/drawdown graphs representing widely different aquifer parameters from well to well.

B. The poor aquifer communication between some closely spaced well pairs during the long-term pump test. (e.g. CRMW-5/CRMW-5A, MW-5/MW-6, MW-11//MW-12, MW-C2/MW-C3, MW-9/MW-10).

C. The inherently low matrix hydraulic conductivity of aquifer lithologies (shales, silty shale, and silt), as well as the high degree of compaction and lithification of these lithologies due to their age and former depth of burial.

D. The divergence in static water levels between some closely spaced wall pairs. (See Summary Report of Short Term Aquifer Testing Program and Long Term Aquifer Testing Proposal, June 1992.)

Response

With respect to the presence of a contaminants emanating from the source areas, CRA believes that even in a fractured medium that concentrations will be higher at the source and decrease along the migration pathway. The evidence indicates that the bedrock aquifer is made of a well developed three-dimensional fracture network. The aquifer is anisotropic, but not to the degree that there is one major preferential pathway. CRA perceives that the EPA is considering the fracture network as a linear rather than a three-dimensional feature and as such is misconstruing potential contaminant migration.

It has been agreed to that the monitoring well networks (with the proposed additional wells) are suitable for detecting contaminants potentially migrating from the disposal sites. Therefore, the presence of contaminants due to waste disposal should be detected in these wells prior to any detections in residential wells. One cannot reasonably expect contaminants to bypass the monitoring well network and nearby domestic wells to appear at residential wells farther afield, in the aquifer found beneath the Site. Therefore, CRA believes our conclusion regarding the presence of contamination are defensible.

3b. Comment

There is abundant evidence from the pump tests to conclude that aquifer anisotropy exists. Since a high degree of litho-logic isotropy also exists and this isotropy is characterized by very low matrix permeability, secondary fractures and primary bedding plane surfaces are essentially the only significant avenues for groundwater migration. Given the variable degree of

aquifer communication in both closely spaced and distant well pairs, it is not difficult the believe that some of the groundwater migration pathways may be relatively isolated from the local system of interconnected fractures.

Most of the fractures within the vicinity of the site probably discharge much of their shallow groundwater to one of the deeply incised gullies downgradient of the CC&SC and Diggs properties. Since the disposal areas on the CC&SC and Diggs properties are so close to these natural discharge areas, and since the depth of burial of the hazardous wastes is relatively shallow (less than fifteen in most cases), the anticipated residence time for potential contaminated groundwater is relatively short. There is also less opportunity for contaminated groundwater to make its way into deeper portions of the fracture system so that it can migrate beyond the incised gullies. This is evidenced by increased stream flow during high precipitation. There is also the potential for a higher degree of infiltration into the deeper portions of the aquifer during relatively low precipitation events.

Response

The evidence indicates that the bedrock aquifer is made of a well developed three-dimensional fracture network. The aquifer is anisotropic, but not to the degree that there is one major preferential pathway. CRA perceives that the EPA is considering the fracture network as a linear rather than a three-dimensional feature and as such is misconstruing potential contaminant migration.

3b Continued Comment

The fact that high concentrations of nickel were observed in MW-11 and MW-12, which are located near the bottom of one of these gullies, suggests that the nickel has become a part of the deeper groundwater which may be migrating off site beyond the gullies which surround Limestone Road site. In addition, the close proximity of these wells to the CC&SC property probably influences the presence of the high nickel levels in these wells. The apparent mounding of groundwater within the hazardous fill is possibly due to differences in soils permeability which may also contribute to the high nickel levels detected in these wells. The high nickel levels in DW-17 may also be the result of deeper contaminated groundwater which has migrated off site within one of the relatively isolated fractures which pass through the Limestone Road site. Unfortunately, there is no way to confirm this based upon the data submitted and it remains as merely an alternative which is a technically sound explanation for the locally high nickel level DW-17. Again, a brine trace would aid in the evaluation the fracture system at the site because it would supply additional information about fracture connection and groundwater flow beneath the site.

Response

The potential migration pathway described in this comment represents a highly speculative mechanism to attempt to relate nickel concentrations in DW-17 to that in MW-11 and MW-12. First of all the waste in the Diggs property is only 15 to 35 feet thick and the mound is not significant to allow contaminant flux to the deeper bedrock. The concept of contaminant migration along a "relatively isolated fracture" is not consistent with the geologic and hydrogeologic characterization of the Site. CRA believes that the Site is anisotropic, as most sites are, and that the fracture network is well developed three dimensional system. The concept of a "pipeline fracture flow" between the CC&SC disposal area and DW-17 proposed in the comment is an implausible pathway.

3c. Comment

In response to the erratic distribution and occurrence of contaminants in nearby residential wells, not all of the fractures which supply drinking water to residential wells actually pass through the hazardous wastes on the CC&SC and Diggs properties. Furthermore, some dilution of these fracture systems (contaminated groundwater) which are part of the interconnected fracture system is expected to occur. Based upon the pump test results, it is apparent that both isolated fractures and interconnected fracture systems are present. Therefore, the site exhibits components of both localized and regional groundwater flow regimes.

Response

The point of the comment is not clear, however, CRA will attempt to respond. First of all any site, exhibits local and regional components of flow. The potential flow of contaminants from the disposal areas is acknowledged to flow along the interconnected fracture system that has been demonstrated by the long-term pumping test and other activities at the Site. Isolated fractures are not a concern with respect to contaminant migration to residential wells. Obviously for contaminants from the Site to reach a residential well the fracture system must be interconnected.

If the interconnected fracture system along which potential contaminant migration occurs is intersected by other fractures which contain clean water, dilution will occur. However, unless additional mass is added to the system, CRA fails to see how a contaminant came reappear further along a fracture network.

4.0 PROPOSED RESIDENTIAL WELL SAMPLING:

1. Comment

The text states the that "Based on the hydrogeologic characterization of the site, groundwater moving beneath the suspected disposal areas may carry contaminants toward the residential area from the southwest direction toward the northwest direction " This statement partially is incorrect. Based upon the regional groundwater flow, contaminants may travel from disposal areas in the southeast to northwest or east to west. Correct this section.

Response

The requested change will made.

2. Comment

This suggested hydrogeologic characterization of groundwater flow fails to acknowledge supporting data that interprets the fracture system as having both a localized and regional flow direction. Moreover, the hydrogeologic characterization fails to acknowledge the observed mounding of the water table within the fill due to possibly different permeabilities between the surrounding native soils and the hazardous fill.

Response

The hydrogeologic characterization is based on that presented in the Long-Term Pumping Test report. CRA is aware that groundwater flow in the bedrock will be along fractures. However, the long-term pumping tests have shown that the aquifer is anisotropic, but not to the degree that one pathway is considered preferential over another. That is why residential wells to the southeast of Diggs property as well as down-dip and downgradient of the Site were selected for further sampling.

The aspect of mounding in the waste having an impact on groundwater flow in the bedrock is questionable. Two monitoring wells are completed in the waste (one in each disposal area). CRMW-1 is completed at a depth of 17 feet below ground surface on the Diggs Property, while CRMW-2, is completed at a depth of 26 feet BGS. The fact that only one well is completed in each of the fill areas makes the conclusion of a groundwater mound questionable.

In addition, undisturbed soil samples have been collected during the SRI and tested for vertical hydraulic conductivity. The vertical hydraulic conductivity ranges from approximately 1 x 10-7 to 1 x 10-8 cm/s. Given the low head, low vertical hydraulic conductivity of the base material the mass flux to the bedrock is small and the presence of any mound would have limited impact

on the bedrock groundwater. the potential for any impact due to mounding at the CC&SC disposal area will be addressed with the installation of a 100-foot deep monitoring well adjacent to the MW11/12 well nest.

3. Comment

Based upon the hydrogeologic characterization and the data presented to date, all the residential wells must be sampled.

Response

CRA strongly disagrees with this comment. The hydrogeologic characterization and the existing analytical data do not support the re-sampling of all domestic wells. However, CRA is prepared to sample and analyze the four wells sampled by EPA in September 1990 that were not sampled as part of the RI. Two rounds of analyses then will be available for these wells.

4. Comment

This section states that "The analytical data for cadmium and chromium indicate that the concentration of these analytes do not exceed the Maximum Contaminant Levels (MCLs) specified in the Code of Maryland Primary Drinking Water Standards." The correct reference is the Primary Drinking Water Criteria which are Federal Drinking Water Standards.

Response

The reference will be revised.

FIGURES

1. Comment

No figure is include which shows the locations of all the residential wells. This must be included in the report.

Response

Figure 3.1 and the plans will be revised to include the additional four residential wells sampled in 1990.

2. Comment - Figure 3.1

"D", and "DW" are used in the figure and the report interchangeably. These designations should be consistent.

Response

All figures and plans will be made consistent with the text and the designation "DW" will be used.

TABLES

1. Comment - Table 3.1

1. **There should be twenty two residential walls in the area not eighteen as you suggest.**

2. **It is suggested that this table include the aquifer type (overburden, shallow bedrock, or deep bedrock) in which the well is completed.**

Response

1. There have been twenty two wells sampled. The table will be revised.

2. The requested data will be added.

2. Comment - Table 3.3

1. **The safe drinking water standards and health advisories promulgated under the Safe Drinking Water Act list the correct Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs) for chemicals, inorganics and radionuclides for drinking water. The MCL for lead (Pb) is 0.015 milligrams per liter (mg/l) or 15 parts per billion (ppb). The MCL for chromium (total) is 0.1 mg/l or 100 ppb and cadmium has an MCL at 0.005 mg/l or 5 ppb. These levels were promulgated in the Federal Register for Drinking Water, Vol. 56, No. 110, June 7, 1991. This became effective December 7, 1992. These are part of the current applicable or relevant and appropriate requirements (ARARs) for the site.**

2. **All MCLs (inorganics, organics, semi-volatiles, etc.,) will be the standards to which the groundwater and residential well data will be compared to evaluate a remedy for groundwater at the site.**

3. **Data for DW-01, if available, should be listed.**

4. **Increase in Pb with time in DW-16 is disturbing. No data is presented for wells around DW-16 (DW-09, DW-10, DW-15). All of these wells should be sampled.**

Response

1. CRA's agrees that the current MCLs for chromium and cadmium are as stated in the comment. However the 15 µg/L/L concentration for lead is a Action Level as specified in FR Vol. 56, No. 110 page 26490 and not a numeric MCL as defined in the Safe Drinking Water Act (40 CFR Parts 141 and 142). This Action Level was established to trigger corrosion control in public water systems.

2. Table 3.3 is a comparison of the indicator parameters selected to the appropriated MCL. It is not intended to be a listing of groundwater standards to be considered during the SRI/FS.

3. Data for DW-01 is presented on Plan 2 (in pocket). These data were not listed on Table 3.3, along with data from DW-05, DW-09-10, DW-13 and DW-15, for none of the indicator parameters listed were detected in these wells. Please refer to the notes at the bottom of the table.

4. Data for DW-09, DW-10 and DW-15 are presented on Plan 2. These wells were not listed on Table 3.3 because none of the indicator parameters were detected in the wells. The increase in lead concentration in DW-16 is, in CRA's opinion, most likely due to plumbing. This is why this well was proposed for sampling. The absence of the indicator parameters in the three well noted above and the vary low concentration of 6 µg/L/L detected once in DW-17, indicate that the lead is not due to contaminant migration from the Site.

3. Comment - Table 4.1

The proposed residential wells to be sampled is insufficient. Moreover, the proposed analyses is inconsistent with the approved WP, approved FSP and approved QAPjP. Section 3.2.1. Groundwater and Table 3.2 in the approved WP list analyses to volatile organics (TAL), metals, and indicator parameters. In the approved FSP, Section 3.1 states the following: "Two groundwater samples will be collected from the newly installed monitoring wells, the existing monitoring wells, and selected residential wells. The samples will be analyzed for metals, indicator parameters, and volatile-organic compounds (VOC's) (Table 3.1)." See attached Table 3.1. Furthermore, Section 5.3.1.2 Domestic-Well Sampling Procedure states "Also, filtered samples will be collected during the initial round. The need to collect both filtered and unfiltered samples during round two will be in a proposal submitted to USEPA and HSWMA (see section 3.3.6)."

Response

CRA intends to sample the selected residential wells in accordance with the approved project plans. CRA does not believe it is necessary to sample all residential wells as required by the EPA, and believes that the well network proposed is adequate to confirm the RI findings that the Site has had no impact on the residential wells.